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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,072	12/21/2005	Michael Andrew Yuratich	MRKS/0142	3875

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EXAMINER

COMLEY, ALEXANDER BRYANT

ART UNIT	PAPER NUMBER
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3746

MAIL DATE	DELIVERY MODE
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07/30/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/562,072	Applicant(s) YURATICH, MICHAEL ANDREW	
	Examiner ALEXANDER B. COMLEY	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 1-3 and 18-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/21/2005, 4/23/2007, 6/25/2007, 12/7/2007, 12/14/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species B (Claims 4-17) in the reply filed on June 5th, 2009 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 4-17** are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,844,397 to Konecny et al.

In regards to Independent **Claim 4**, Konecny et al. discloses an improved downhole pumping system that employs a variable speed PWM (pulse-width modulated) inverter and transformer setup in order to efficiently drive an induction (i.e. three-phase) motor over a range of different speeds. To begin, Konecny discloses a drive circuit for driving a submersible pump by stating, "The present invention relates to an improved downhole pumping system utilizing an electric motor. More particularly, the invention concerns a system for extracting fluids from a well by using an induction motor coupled to a variable speed pulse width modulated (PWM) inverter (i.e. variable voltage source) via a non-gap transformer." (Col. 1, Lines 12-18) More specifically, Konecny discloses a means for generating cyclically varying waveforms by stating "The invention

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receives electrical power from a three phase power supply 602 (FIG. 6). Preferably, the power supply 602 provides an A.C. voltage waveform of about 380 or 480 A.C. volts (RMS), with a frequency of 50-60 Hz. The power supply 602 is electrically connected to a three phase full-wave rectifier 604, which receives the waveform provided by the power supply 602 and converts it into D.C. voltage.” (Col. 4, Lines 58-65) Konecny also discloses the use of a PWM drive (i.e. upper and lower voltage levels) by stating “One approach that is used to develop rectangular voltage signals for PWM drives is the "sine-triangle" scheme. As shown in FIG. 3, this method designates high and low periods of a rectangular voltage signal 300 based upon the intersection between a triangular wave 302 having the desired chopping frequency ($f_{sub.PWM}$), and a sinusoidal signal 304 having the desired electrical driving frequency of the motor ($f_{sub.\omega}$). The rectangular signal 300 is (1) high when the sinusoidal signal 304 is greater than the triangular wave 302, and (2) low when the sinusoidal signal 304 is less than the triangular wave 302.” (Col. 2, Lines 24-34) Clearly, the PWM drive circuit utilizes high and low voltage levels for different periods of time in order to drive the motor at different speeds. Most importantly, however, is Konecny's use of a smoothing circuit designed to eliminate voltage harmonics (i.e. transient voltage spikes) in order to smoothly transition from high voltage levels to low voltage levels. To begin, Konecny states "Although PWM drives provide a number of benefits, such as avoiding the potentially damaging harmonic frequencies generated by six step drives, conventional PWM drives may present certain problems in some applications. One problem is that PWM drives generate direct current (D.C.) offsets due to slight switching time biases

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and a beat-like phenomenon between the fundamental frequency and the chopping frequency. These small offsets will saturate a non-gapped transformer.” (Col. 3, Lines 1-8) Konecny then states “The rectifier 604 provides a D.C. voltage of about 537 or 680 volts, depending upon whether the voltage of the power supply 602 is 380 or 480 A.C. volts, respectively. The rectifier 604 is electrically connected to a smoothing circuit 606, which reduces ripples in the voltage provided by the rectifier 604. An inverter 608 receives the smoothed D.C. signal from the smoothing circuit 606 and provides a three phase signal to the motor 600 via a transformer 610. The inverter 608 provides a PWM signal, which may be varied according to inputs from a controller 612, thereby adjusting the frequency of rotation of the motor 600.” (Col. 4, Line 65 - Col. 5, Line 8) Clearly, Konecny’s system provides a driving circuit for a submersible pump in which the variable voltage source produces driving waveforms in which the variable voltage levels are smoothly transitioned from upper levels to lower levels in order to efficiently control the rotational speed of the motor via a three-phase output means.

4. In regards to dependent **Claims 5-6**, it is clear that Konecny’s three-phase power supply 602 drives all phases (3 phases) of the motor simultaneously, and moreover, that the variable voltage supply is switched between upper and lower voltage levels (See Col. 2, Lines 13-34) Similarly, in regards to dependent **Claims 7-8 & 10-13**, Konecny’s invention is specifically aimed at providing a pulse-width-modulated time-dependent sequence in order to smooth out the voltage transitions through a range of different motor speeds (i.e. high speeds). (See Col. 2, Lines 13-34; Col. 3, Lines 42-51;

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Col. 4, Line 58- Col. 5, Line 8; Abstract) Konecny also specifically states that the frequency of the variable voltage source is varied with the output of a chopping mechanism by stating “The motor may be started by ramping flux producing current to a first preset value at a low frequency, then ramping torque producing current to a second preset value. If a flux measurement indicates the motor has stalled, the second preset value is increased, and the routine is restarted. Otherwise, if no stall has occurred, the motor's speed is ramped to the desired value. Ongoing operation of the motor is managed by a drive routine, which generates triangular and sinusoidal signals based upon a desired chopping frequency, as well as a desired driving frequency of the motor.

(Abstract) Regarding dependent **Claim 9**, Konecny clearly discloses the use of a filter in Figures 6-7 (Also see Col. 5, Lines 33-56) In regards to dependent **Claims 14-15**, and with particular reference to Figure 7A-1, Konecny discloses the use of two capacitors (706, 708) connected to first and second supply voltage sources (701, 702), and selections means (705) designed to selectively vary the voltage (based on the duty cycle) supplied by the buses (701, 702) (See Col. 5, Lines 44-67) Regarding dependent **Claim 16**, the transformer of Konecny's drive circuit acts as a poly-phase boost converter (i.e. step-up converter). In particular, Konecny states “Typically, the variable speed drive and a drive controller of a selected type are operatively connected between the power line and a transformer. The transformer is utilized to drive the motor, and more particularly to step up the level of voltage and reduce the current supplied to the motor. This is especially important in applications such as downhole pumping operations, where a long cable connects the transformer to the motor; in these

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situations, the transformer helps prevent excessive current from flowing in the long cable.” (Col. 1, Lines 53-61) And finally, regarding dependent **Claim 17**, Konecny specifically discloses a transformer with first and second windings (See Col. 6, Lines 35-57).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following selected patents and technical literature is cited to further show the state of the art in electric submersible pump drives and related technology in general where the not all obvious salient features of the patents are disclosed as follows:

- US Patent No. 6,531,842 to LeDoux et al. discloses a variable speed drive that provides filtering of unwanted harmonic frequencies (i.e. transient voltages)
- US Patent Application Publication No. 2001/0032721 to Rider et al. discloses a sine wave filter for a three-phase variable frequency drive that is designed to smooth the voltage waveforms of a pulse width modulated drive

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER B. COMLEY whose telephone number is

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(571)270-3772. The examiner can normally be reached on M-F 7:30am - 5:00am EST (Alternate Fridays Off). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon C. Kramer can be reached on (571)-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alexander B Comley/
Examiner, Art Unit 3746

/Charles G Freay/
Primary Examiner, Art Unit 3746

ABC